

CLAIMS:

1. Method of producing a semiconductor device comprising:
 - a) providing a semiconductor substrate,
 - b) making a first amorphous layer in a top layer of said semiconductor substrate by a suitable implant, said first amorphous layer having a first depth,
 - 5 c) implanting a first dopant into said semiconductor substrate to provide said first amorphous layer with a first doping profile,
 - d) applying a first solid phase epitaxial regrowth action to partially regrow said first amorphous layer and form a second amorphous layer having a second depth that is less than said first depth and activate said first dopant,
 - 10 e) implanting a second dopant into said semiconductor substrate to provide said second amorphous layer with a second doping profile with a higher doping concentration than said first doping profile,
 - f) applying a second solid phase epitaxial regrowth action to regrow said second amorphous layer and activate said second dopant.
- 15 2. Method according to claim 1, wherein said semiconductor substrate is a Si substrate and action b) is performed with at least one of Ge, GeF₂, Si, Ar or Xe atoms.
3. Method according to claim 2, wherein said action b) is performed with Ge in a
20 dose of 10¹⁵ atoms/cm² and an energy between 2 and 30 keV.
4. Method according to any of the preceding claims, wherein said action c) is performed with at least one of B, P, As and In at an energy between 3 and 10 keV, and a dose of 10¹⁴ atoms/cm².
25
5. Method according to claim 5, wherein action d) is performed at a temperature of 550-750 °C during a few seconds.

6. Method according to any of the preceding claims, wherein said action e) is performed with at least one of B, P, As and In at an energy between 0.5 and 3 keV, and a dose of 10^{15} atoms/cm².
- 5 7. Method according to any of the preceding claims, wherein prior to said action b), an initial dopant is implanted to provide a HALO implant area extending deeper than said first amorphous layer.
8. Semiconductor device made by a solid phase epitaxial regrowth technique,
10 comprising a semiconductor substrate with a first area having a first conductivity profile and a second area having a second conductivity profile, the second area having a thickness of 6-12 nm and being located adjacent to a top surface of said semiconductor substrate, and said first area having a thickness of 2-6 nm and being located adjacent to said second area, said second conductivity profile having a lower conductivity than said first conductivity profile.
- 15 9. Metal oxide semiconductor device comprising a device as claimed in claim 8.
10. Apparatus provided with a semiconductor device as claimed in claim 8 or 9.